

PRACTICAL SOLUTIONS TO COMPLEX HALLUX LIMITUS PROBLEMS

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INTRODUCTION

Hallux limitus can be a painful condition with consequences that go beyond joint destruction of the first metatarsophalangeal joint (MTPJ) such as biomechanical issues as a result of the compensation due to either pain or joint changes. Once the joint becomes painful, the patient will change the way they ambulate and this can lead to knee, hip, or ankle pain. Posterior tibial tendinitis can also result from the change in mechanics. The patient will often abduct the foot and roll off of the medial aspect to avoid motion at the first MTPJ. The result of this is repeated strain on the posterior tibialis as it attempts to combat the collapse of the medial arch. In time, the first ray will have structural changes due to the limited motion of the joint and this can also lead to the strain of the posterior tibial tendon. An initial treatment of orthotic support will provide a temporary solution but will only work while the orthotic is being used. The solution is to restore the motion of the first MTPJ.

When the joint gets to the advanced stages where the motion is restricted, the symptoms associated with the condition worsen and a new complication can occur. Soft tissue can break down especially in the neuropathic patient. The ulcers that are caused by limited motion of the first MTPJ are on the plantar medial aspect of the hallux and can be very difficult to heal. The ulcer requires the complete absence of pressure to heal and often the ulcer will return as soon as the toe has pressure on it again from walking.

PATHOMECHANICS

Several causes of hallux limitus exist and it is very common for it to be a result of a variety of problems. The lack of motion then leads to arthritic changes in the joint that further limits motion and increases the pain. Compensation for other foot-related pathologies can also lead to limited motion of the first MTPJ such as ankle equinus or pes valgus. In both of these cases, the axis of the joint motion changes and the joint locks up creating a limitation of motion that may not be observed when testing the motion in a non-weightbearing setting. This type of hallux limitus is a functional limitus and is frequently the cause of plantar ulcers on the hallux that are friction related. The key to successful hallux limitus

repair is to understand the pathomechanics of the condition and adjust the treatment to correct the problem instead of always doing the same procedure on this condition.

SHORTENING OSTEOTOMY

In the author's opinion, the easiest way to initially reconstruct the joint to treat the condition of hallux limitus is to perform a shortening osteotomy. This procedure works best for the patient with a long first metatarsal. The procedure essentially lengthens all of the soft tissue structures and can change the orientation of the joint to maximize the ability to dorsiflex.

A chevron osteotomy allows for easy tri-plane correction and can be fixated in a variety of ways and with several sizes of screws. When the capital fragment is moved, it needs to be plantar flexed. If the patient also has a hallux valgus deformity then this can easily be accomplished by orienting the axis guide so that the capital fragment is moved in the appropriate direction. When the condition is such that the capital fragment does not have the room to move in a lateral direction then 2 saw blades can be used when making the dorsal cut and this extra space will allow for pure sagittal plane correction of the metatarsal head position.

The cheilectomy should also be performed as part of this procedure however it is best to do the osteotomy and fixate first, so that enough cortical bone is left for the fixation (Figure 1).

Doing a cheilectomy without an osteotomy is simply a short-term solution since the orientation of the joint and other associated factors such as a long first metatarsal have not been addressed.

REVISIONAL HALLUX VALGUS SURGERY

One cause of failed hallux valgus surgery is the lack of correction for the limitus component of the original problem or the creation of hallux limitus by the procedure itself. When the joint has been operated on previously, sometimes the most practical procedure is to simply fuse the joint and be finished with it. However, when the patient is willing to take a chance on another joint salvaging procedure, often a little creativity can produce a very good outcome.



Figure 1A. Preoperative hallux limitus.

When evaluating the joint to determine the type of reconstruction to perform, the first step is to see what is left of the joint to work with. The more bone that is present, the more the options that will exist. When possible it is best to try and to preserve and use as much of the joint surface as possible. When a procedure was done that leaves the first metatarsal head in a staked condition it is ideal if a rotational osteotomy can be done to not only shorten the bone if needed but to also place the lateral side of the joint with cartilage still intact in a functional position. Both the Austin and Reverdin-Greene osteotomies work well for this. The fixation used for these type of procedures will usually be the same as for any type of first metatarsal osteotomies but back up plans should be considered if the bone is less than ideal or the amount of bone will not support screw fixation.

HALLUX LIMITUS REPAIR WHEN A PLANTAR WOUND IS PRESENT

When a persistent plantar wound is present on a hallux, the cause is often limited motion of the first MTPJ. Any of the techniques for hallux limitus will work, however in a patient with comorbidities that make a repositioning osteotomy with fixation impossible, a simple base resection offers a great option with little loss of stability. The procedure is done by resecting the base of the proximal phalanx and removing any spurs. The incision is small and the dissection is minor so as to limit soft tissue complications. The hallux is held in place with 2 Kirschner wires (K-wires) temporarily for 2-3 weeks until the dorsal incision is healed. When the fixation



Figure 1B. Postoperative hallux limitus repair with reconstructive osteotomy.

is not used there is risk of wound dehiscence at the incision site because of the change in the joint. Usually the plantar wound is healed in 2 to 3 weeks (Figure 2).

THE DEFINITIVE SOLUTION

When the joint condition warrants or the patient simply wants a onetime definitive procedure, the fusion of the first MTPJ is hard to beat. Here is the guide that the author uses to determine the condition of the joint on the radiograph and the quality of motion that does exist. When the lateral radiograph of the first MTPJ shows the normal round contour of the metatarsal head in spite of the peri-articular spurring and the quality of the motion is good in spite of the limited amount, then usually the joint can be reconstructed with a joint salvage procedure.

However, when the contour of the metatarsal head is clearly disrupted or the quality of the limited motion is poor or painful then the joint should be fused. Many kinds of fixation can be used for fusion of the first MTPJ. The author prefers to use 2 smooth K-wires and resect the joint with 2 parallel cuts that leave the raw bone surfaces flush and in a stable position. The K-wires are placed across the joint in a slightly nonparallel orientation to help lock the surfaces together. At the end of 6 weeks, the wires are removed. During the postoperative period, the patient may have limited ambulation in a rigid postoperative shoe (Figure 3).

In conclusion, hallux limitus is a common foot pathology that can be treated in many ways. Common sense surgical approaches can be used with good results tailored to the needs of the patient.



Figure 2A. Preoperative hallux ulcer that did not respond to any wound treatment.



Figure 2B. Postoperative hallux limitus repair at 3 weeks with base resection.



Figure 3A. Preoperative hallux limitus.



Figure 3B. Immediate postoperative first MTPJ fusion.



Figure 3C. Fused joint at 6 weeks with K-wires pulled.